MARCH 1974

MUNGER AFRICANA LIBRARY NOTES

24 IN SEARCH OF MAN: SOME QUESTIONS AND ANSWERS IN AFRICAN ARCHAEOLOGY AND PRIMATOLOGY

Munger Africana Library Notes, issued six times a year, are eclectic within the field of Africana.

Issues are generated from seminars by distinguished visitors, reports of current field research, unpublished historical manuscripts, and other material deemed useful to Africanists. Large color photographs of African art objects or of subjects illustrative of the text are a feature of all issues since Volume I.

Viewpoints expressed in these Notes are solely the responsibility of the individual authors and may or may not have the concurrence of the editorial board.

Assistant Editors:
Monique Le Blanc (MA UCLA) African Studies
Joanne Clark (BA CSCLA) English
Business Manager: Kathie Marcum
Circulation Manager: Joy Hays
Subscriptions: are $10 a volume. Prices of individual issues vary, but the total cost of a year's issues is always in excess of the $10 subscription price.
Business and editorial correspondence should be addressed to:

Munger Africana Library
California Institute of Technology
Pasadena, California 91109 U.S.A.

MUNGER AFRICANA LIBRARY NOTES

One Dollar Issue #24 March 1974

IN SEARCH OF MAN: SOME QUESTIONS AND ANSWERS IN AFRICAN ARCHAEOLOGY AND PRIMATOLOGY

Bernard Campbell
J. Desmond Clark
Raymond Dart
Dian Fossey
David Hamburg
Richard Hay
F. Clark Howell
Glynn Isaac
Mary Leakey
Jane Van Lawick-Goodall

FRONT COVER: Dian Fossey and Gorilla Friends, Courtesy of the National Geographic Society

Introduction

This publication is based upon the final session of the Leakey Foundation Symposium, "In Search of Man," which was held on December 2, 1973, before an audience of 1,000 in San Francisco, California.

For thousands, perhaps tens of thousands of years, man has been driven by an insatiable curiosity about himself to understand his own origins, behavior, and prospects for survival. Within the past 15 years, valuable archaeological research and primate studies have thrown new light on the whole process of man's evolution. Today, the buried record can tell not only of man's bones and material culture, but of something more: his environment, his diet, and finally, even his social life and behavior. However, meaningful interpretation must rely on our growing knowledge not only of the fossil evidence but of the biology and behavior of living primates as well.

It was in this 20th century spirit of open inquiry and multi-disciplinary sharing that ten world renowned scientists participated in the two-day Symposium. After the scientists had presented their research individually, with the aid of color slides, color films, and even taped gorilla calls, they gathered for a final question and answer session. The questions from the audience reflected the stimulation of the presentations as well as the level of knowledge among the informed lay persons present.

This publication is not presented as a keenly honed scientific paper for which the speakers refined their spoken answers. The answers were provided without introducing technical language which might possibly be incomprehensible to a broader public. A few questions may seem slightly out of context to those readers who did hear the original presentations in greater depth. However, the range of questions covering multiple disciplines and their interaction is indicative of the scope of the full Symposium. The answers provide a panoramic view of African archaeology and primatology, as well as sapient observations on conservation, philosophy, and the future of homo sapiens.

Although all of the ten panelists live or have lived in Africa, some readers may note the absence of black African scholars. The subjects under discussion have so far attracted relatively few African scholars. The Leakey Foundation is currently supporting John Onyanga-Abuje's field research in East Africa. Special efforts are being made under the leadership of Professor Boniface I. Obichere of UCLA to attract more Africans to these fields, and funds have been pledged toward their support.

Symposia are one of the heuristic devices used by the Leakey Foundation, along with films, tape cassettes, a highly successful public lecture program, and private dinners where scientists address Fellows of the Foundation. The first Symposium was held in 1972 at the California Institute of Technology and was to have consisted entirely of lectures by the late Dr. L. S. B. Leakey. When he died en route to the first Symposium, ten collegial friends decided to hold the Symposium in his honor. The demand for places exceeded the capacity of the auditorium. This was also true for the San Francisco Symposium. Future Symposia within the next two years are planned for Atlanta, San Diego, Boston, Chicago, and London.

Finally, a word of appreciation to Dr. Bernard Campbell, Dr. Richard Flint, Joan Travis, and Wilma Fairchild for editorial contributions, and to Jocelyn Murray for the map. This publication has been made possible through the generosity of the Belvedere Scientific Fund.

E. S. M.

DR. BERNARD CAMPBELL

"Studies of Human Prehistory--Guideposts to Survival?"

Born in England and educated at Cambridge, Dr. Campbell has been Professor of Anthropology at UCLA for several years. His particular interest in fossil man has led to publication of a variety of monographs and books. He is one of the major consultants for The Missing Link, one volume in a new series of books published by TIME/LIFE, "The Emergence of Man."

DR. J. DESMOND CLARK

"Ways of Interpreting the Past"

Dr. Clark was born and educated in England. For twenty years, the Director of the Museum in Livingston, North Rhodesia (now Zambia), Dr. Clark is Professor of Anthropology at Berkeley where he teaches African prehistory. He has carried out excavations in a number of countries in Africa and has published several important books and scientific papers on the prehistory of Africa.

DR. RAYMOND A. DART

"The Discovery of Australopithecus and Its Implications"

Australia-born anatomist, Professor Emeritus at the University of the Witwatersrand in Johannesburg, South Africa, Professor Dart is credited with having defined a new genus of hominid, Australopithecus. It was Dart whose breadth of vision also gave the original impetus to some important field studies of gorillas and other living, non-human primates.

DIAN FOSSEY

"Years with the Mountain Gorilla"

With the recommendation and early guidance of Dr. Louis Leakey, this daring young American woman embarked on a study of gorillas in the remote African Highlands of Rwanda. Her studies help to shed light on a threatened species in a way that may also help us to better understand early man.

DR. DAVID A. HAMBURG

"Some Implications of Primate Studies for the Understanding of Aggressive Behaviour"

Formerly Chairman of the Department of Psychiatry at the Stanford School of Medicine for eleven years, Dr. Hamburg is now involved in new, inter-disciplinary programs of education and research relating to the understanding of human behavior. He is associated with Dr. Jane Goodall in the study of chimpanzee behavior at the new Primate Outdoor Research Facility at Stanford and in Africa.

DR. RICHARD L. HAY

"The Geology of Olduvai Gorge and its Meaning for the Understanding of Human Evolution"

Professor of Geology at Berkeley, Dr. Hay has for many years been associated with Mary Leakey in field studies of the fossil record of early man and his palaeoenvironment at Olduvai Gorge, Tanzania.

DR. F. CLARK HOWELL

"Palaeoanthropology as an Interdisciplinary Approach to the Study of Human Origins"

Dr. Howell, Professor of Anthropology at the University of California at Berkeley, has also been Director of several international teams in the exploration and excavation of archaeological sites in Spain and Ethiopia. He has authored many monographs and books, among which is Early Man--LIFE Nature Library Book, and has acted as consultant for the new TIME/LIFE series, "The Emergence of Man."

DR. GLYNN Ll. ISAAC

"Discoveries East of Lake Rudolf--Early Traces of Human Behaviour"

Dr. Isaac was educated in Capetown, South Africa, and in Cambridge, England. He worked under Dr. Louis Leakey in Africa from 1961-1965. Since that time, he has been alternating his commitments as Professor of Anthropology at Berkeley and as co-leader with Richard Leakey of the Lake Rudolf expeditions in northern Kenya.

DR. MARY D. LEAKEY

"The History and Meaning of the Discoveries in Olduvai Gorge"

Wife and co-worker of the late Dr. L. S. B. Leakey, Dr. Mary Leakey's energies have been directed to digging out and recording the geologic, animal, and human history of Olduvai Gorge, Tanzania, for more than thirty years.

DR. JANE VAN LAWICK-GOODALL

"The Chimpanzee: Portrait of the Best Known Ape"

Dr. Goodall's career as an ethologist was launched by Dr. L. S. B. Leakey in 1960 when she committed herself to an in-depth, long-term study of wild chimpanzees at the Gombe Stream Reserve in Tanzania. She is increasingly convinced that a fuller understanding of human behavior can be reached through careful correlation of her research in Africa with behavioral-biological studies of chimpanzees in semi-enclosed areas at Stanford University.

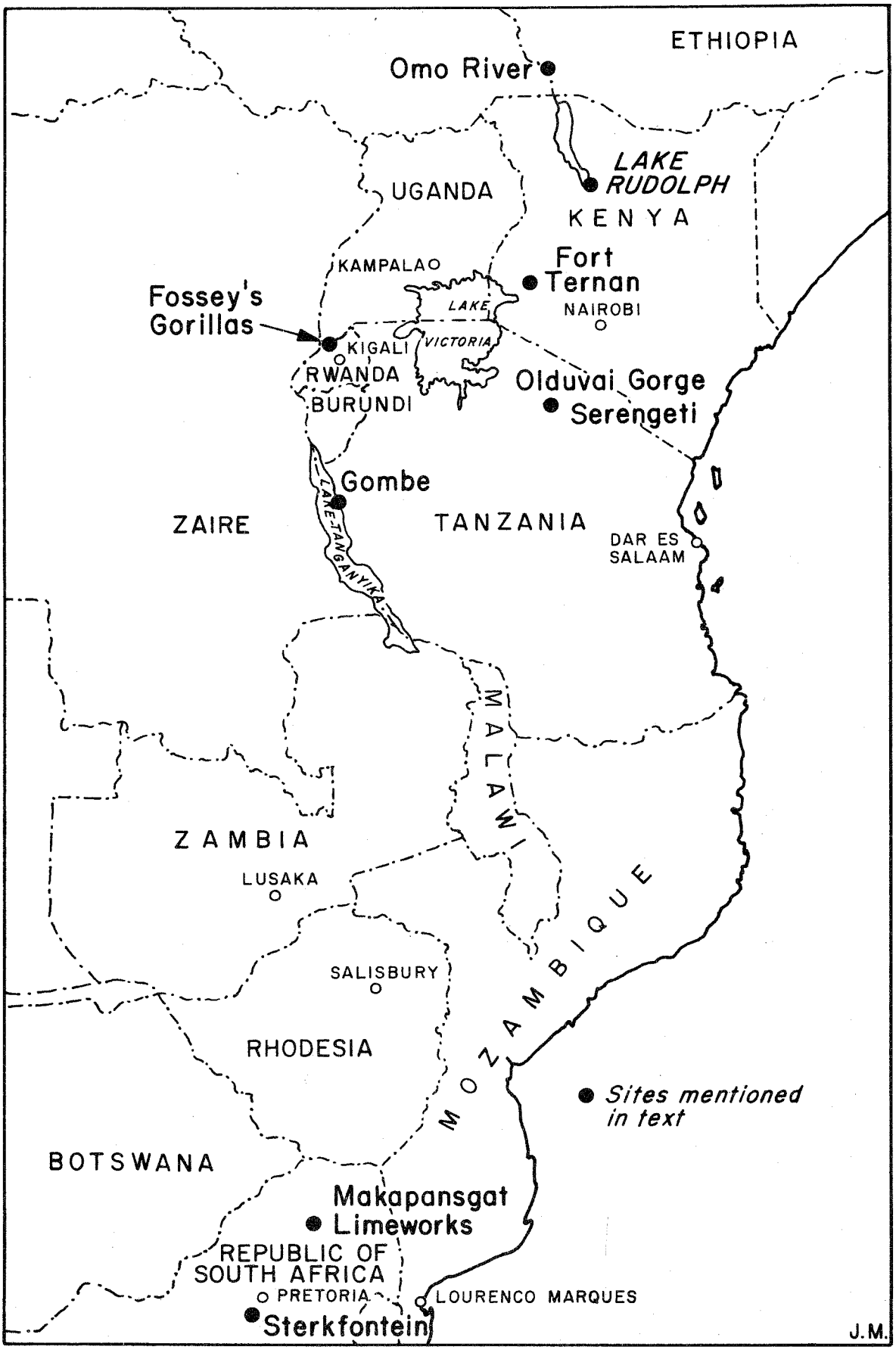
IN SEARCH OF MAN:
SOME QUESTIONS AND ANSWERS
IN AFRICAN ARCHAEOLOGY AND PRIMATOLOGY

Dr. Campbell: We have a large number of questions here. I'll try to divide them up fairly evenly among the contributors, and I hope we will be able to fit in quite a number of them. I would like to start with a question for Dian Fossey. Dian, your film did not show the gorillas either fighting or copulating. Does this mean that you have been unable to observe either activity?

Dian Fossey: I have observed both copulation and, to a lesser degree, some aggression. Copulation has been observed with the dominant silverback of the group when there is a subdominant silverback, not necessarily right next to him, but say forty or fifty feet away, and the subdominant animal pays no heed. In cases where the subdominant blackback, Didget, has been observed copulating, the dominant silverback of that particular group, Uncle Bert, has also been forty or fifty feet away, without minding, apparently. Aggressive behavior has been observed on some occasions, but it is not frequent because of the manner in which the gorilla has learned to handle overt aggressive tendencies by parallel displays.

Dr. Campbell: Here is a question for Dr. Hay. Where did the sediment of which the layers of rock in Olduvai Gorge are made, come from? And, if all the sediment came from the same area, why do the layers look different?

Dr. Hay: Sediment of the Olduvai beds was eroded and transported both from the volcanic highlands to the south and east of the Olduvai basin and from ancient metamorphic rocks to the north and west. In general, the proportion of sediment from the volcanic highlands decreases from Bed I onward, whereas the metamorphic detritus increases. The layers look different because they were deposited in different environments. This affects the appearance of a sedimentary deposit even more than its mineral composition does. For example, the red beds of Olduvai Gorge are stream-laid sediments that


ETHIOPIA
Omo River
LAKE RUDOLPH
KENYA
UGANDA
KAMPALA
Fort Ternan
NAIROBI
Fossey's Gorillas
LAKE VICTORIA
KIGALI
RWANDA
BURUNDI
Olduvai Gorge
Serengeti
Gombe
ZAIRE
TANZANIA
LAKE TANGANYIKA
DAR ES SALAAM
MALAWI
ZAMBIA
LUSAKA
SALISBURY
RHODESIA
MOZAMBIQUE
Sites mentioned in text
BOTSWANA
Makapansgat Limeworks
REPUBLIC OF SOUTH AFRICA
PRETORIA
LOURENCO MARQUES
Sterkfontein
J.M.

weathered in a highly saline soil environment. Lake sediments at Olduvai tend to be green and marshland deposits are gray or brown.

Dr. Campbell: How far do the layers extend beneath the Serengeti Plain?

Dr. Hay: The different Olduvai beds extend for various distances beneath the Serengeti Plain, as shown by outcrops, chiefly in fault scarps, to the north and south of the gorge. From these exposures we can tell, for example, the outline of the lake basin at the time of Bed I, and that it had a diameter of about twenty kilometers or twelve miles.

Dr. Campbell: Here's a question for Dr. Glynn Isaac. What is the spark of evolvability that permitted man to change so much, while his simian cousins remained basically the same?

Dr. Isaac: The modern understanding of evolution, right or wrong, is that it is a restless and opportunistic process in which animal numbers, in some sense, have a capacity to expand, and in which environmental considerations, a balance of species, restrains them. This creates a situation in which any change in the genetics of an animal population, which gives it an advantage, can lead to a trend in evolution. On this basis, the assumption is that at some stage a common ancestor to us and the apes began to have an advantage by doing the things that are particularly characteristic of man, and so there began an evolutionary trend. Of course, we would suppose that selection acted upon differences in things like the propensity to hunt, to engage in social sharing of food, to enhance bodily anatomy by using equipment. All of these are complexes involving the capacity of both the body and the brain to learn cultural behavior. The notion is that selection picked these off as they appeared in the rich and diverse behavior of the higher primates, and proceeded, in effect, to enlarge them, to make them more and more important, while other groups continue to exist and survive--as the chimpanzees, orangs, and gorillas have done--with behavior patterns that involve these distinctive behaviors to a much lesser degree.

Dr. Campbell: Here's a question I would like to ask Jane Goodall. It has been noted that two of the most eminent researchers in primatology are women. Do you think that women have the advantage in gaining the trust of these wild animals as opposed to men? Do the primates perceive a sex difference among the observers, and do they show a differential behavioral response to them? Given that the primates have a more highly developed olfactory sense than man, do you think the animals may perceive the sex difference through their olfactory observation of the observers?

Dr. Goodall: Well, that is a series of questions. I think the answer in general is that whereas we find the chimps sometimes show a differential response to maleness or femaleness--typically, I think, to the voice--on the whole the response is to the nature of the person. It so happens that many of the best male field researchers are people who are quiet and gentle, who don't make sudden movements, and who speak softly, and I think that is the characteristic which enables people to establish good rapport with the animals they are studying. It happens to be a fairly typical characteristic of many of the women who have gone into the field. With respect to the ability to differentiate sexuality by means of the smell, I don't have any information on that. I know it is true with some of the carnivores, but I don't know about the primates.

Dr. Campbell: Thank you very much. It's a question I myself have often wanted to ask. The next question is addressed to Dr. Mary Leakey. If the fate of Homo habilis is unknown, have any theories arisen over their possible interbreeding and/or extermination by Homo erectus?

Dr. Leakey: That is really almost impossible to answer because we have no evidence. So far as I am aware, there are no fossil hominids that show any evidence of such interbreeding. We seem to get habilis as such and it disappears and Homo erectus appears on the scene. But there are no fossils that suggest that there was interbreeding.

Dr. Campbell: Here's one for Dr. Hamburg. Is there a condition of homosexuality in nonhuman primates? If so, is it a learned social condition or genetically based?

Dr. Hamburg: I might combine the response to that with another question that was handed to me directly about male-female differences and the extent to which they are inexorable or unmodifiable, the extent to which they are determined by hormones. As to the homosexuality question, I think that, as Dr. Campbell said earlier, there is really very little evidence of homosexuality in anything like the human sense among nonhuman primates in the natural habitats. Some observations of it have been made in laboratories. In a nutshell, I don't think monkeys and apes have been studied under enough different conditions in laboratories, but the behavior does seem to be in some way a product of some laboratory environments. Now with regard to the male-female sex difference, I think essentially the answer is that there are not sufficient data with respect to the role of hormones in behavior in contemporary man to be really sure how modifiable these behavioral preferences are. I believe the most interesting line of inquiry in the past few years has been one which has led from rodents to primates to the human with a certain amount of continuity, and that is the experiments concerning the early administration of testosterone. If the testosterone is given to a pregnant monkey, and if she happens to be carrying a female, the female will to a certain extent be masculinized, both in anatomy and in behavior. The behavioral masculinization includes a shift toward the rough and tumble play which is characteristic of rhesus infants early in life, and this heightened aggressiveness, more of the male type, does persist into adult life to a certain extent. Now, the same line of inquiry has been studied in two human situations in which, unfortunately, pregnant mothers were inadvertently given androgens, testosteronelike compounds. There was some effect of that type, but not as striking. The girls who were exposed in utero to relatively large amounts of androgens showed, even into late childhood, some shift in the male direction, though not to the point of any overt homosexuality. But there really isn't time to pursue the subtlety of it. All I'm saying is that there is at least some modest indication that these hormone/behavior relationships may still persist in the contemporary human, but surely there is an enormous amount of modifiability, and yes, human males can learn to care for infants very well.

Dr. Campbell: This question is for Clark Howell. Have any


Bernard Campbell
Mary Leakey
Raymond Dart
Desmond Clark
Dian Fossey
David Hamburg
Jane Goodall
Clark Howell
Glynn Isaac
Richard Hay

gracile types of Australopithecines been recovered from the Lake Rudolph or Omo areas? We come right up against the problem of nomenclature here, but I'll leave it to Clark to disentangle the question.

Dr. Howell: The great majority of all the hominids found in both places are in fact the big, robust, massive kinds, and there is a question of what they should be called--a question which is still not resolved for certain complicated reasons. In East Rudolph there are lots of remains, as you know, of clearly Homo type from up in the higher levels. Then there is this very exciting fossil found last year, with only a number on it so far (ER-1470), which has been referred to as Homo species and comes from an early horizon. There is some discussion now as to whether it should be called Homo species and, if so, what then do you do with the meaning of Homo?

Until recently, there has been no good evidence of something that could be called a gracile kind of Australopithecine. That to me means the kind of early hominid that Dr. Robert Broom found first at Sterkfontein and that Professor Dart and his students found later at Makapan lime works. That kind of small creature. I showed the vertebral column of one in my film. We hadn't had any of those from the Omo, we thought, for several years, but at least I personally am now inclined to think we may well be finding something of that sort in early ranges of time. There is one very provocative example, I believe, from East Rudolph that has been reported but left unnamed, and there are several specimens--in fact, I showed pictures of some without saying what they might be--of that kind of thing from the middle and lower parts of the Omo succession. But we have only fragmentary material; we need more complete specimens, more comparative specimens, in order to make sense out of this.

Dr. Campbell: This is a question I would like to address to Dr. Desmond Clark. At what point can tool making be distinguished from tool use? Is man making a tool of a stone if he carries it from one place to another to use for a specific purpose, even though the modification is only one of locality?

Dr. Clark: So far as the first part is concerned, the earliest

evidence we have is that from East Rudolph, dating about 2.6 million years ago, followed, shortly after, by this magnificent bulk of evidence from Olduvai Gorge and also from Omo. But there was an interesting, though perhaps slender, piece of evidence that Dr. Louis Leakey obtained from Fort Ternan in association with the concentration of Kenyapithecus or Ramapithecus fragments, dating to about 14 million years back. That was a bashed piece of stone that apparently was foreign to the immediate area of this concentration; it was lying close to two or more limb bones that showed comminuted bone and both compressed and other fractures. This piece of lava had been broken on at least two separate occasions, and one ridge down the center showed a series of bashing marks. Somewhere along the line, of course, we have got to find evidence for tool use--that is to say, the manipulation of naturally favorable artifacts. Quite obviously a piece of rock with a sharp edge that could be used for bashing as well is something that's going to be picked up, carried, and used for purposes of this kind. Also, of course, the association of the artifacts with bone fragments implies the suggestion of meat eating. It's a slender piece of evidence, but when we get back in that time range this is the kind of data that we are going to have, and therefore we have got to be particularly careful in looking for it and recording it.

Dr. Campbell: Dr. Hay, what is the evidence that people were living right at the shore of the lake in Olduvai Gorge and not farther away?

Dr. Hay: All evidence of hominid activities--that is, stone tools, occupation sites, and food refuse--is found within sediments laid down at the margin of the lake; not a single stone tool has been found in the stream-laid sediment of the alluvial fan to the east. We can identify the lake-margin sediments by the content of fossils--for instance, crocodile, flamingo, hippo, and turtle--as well as by their geographical position between the lake beds and the alluvial deposits.

Dr. Campbell: The next question is for Dian Fossey. Reference was made to a dominance hierarchy among the female gorillas. How is such status achieved?

Dian Fossey: I believe it is achieved by blood ties. The infant born of a dominant mother is going to be dominant as it matures. I have only been there six years, so I cannot establish how the mature females, all of whom are now over ten years of age, achieved their dominancy. All I can do is observe the infants as they mature.

Dr. Campbell: Dr. Leakey, do you have any students or graduates working with you at Olduvai Gorge, and if so, how did they obtain their jobs?

Dr. Leakey: I'm afraid the answer is no, I have not got any, and if I had, I think it would be better to keep secret how they managed to obtain their jobs.

Dr. Campbell: Dr. Goodall, what are your ideas as to why chimps are ardent tool users and gorillas are not?

Dr. Goodall: Well, I think part of that Dian Fossey answered yesterday, when she said she had observed very little in the habitat of the gorilla that seemed to demand the use of objects as tools. I think, however, it goes a little bit beyond that. The chimps do certain things with objects which there is no call upon them or pressure upon them to do in any sense that I can see. For instance, the use of leaves to wipe dirt off the body presumably can happen just as much with gorillas. The chimpanzees don't need to crumple leaves into a sponge to drink water from a hollow in a tree, and indeed in some areas they don't do it; they just dip their hands in. I think the chimpanzee, for some reason that I couldn't give, has a propensity for handling objects and for applying objects to different contexts in his environment.

Dr. Campbell: Dr. Isaac, please comment on the finds made in Kenya by the Harvard group led by Bryan Patterson, specifically the Lothagam jaw and the humerus fragment from Kanapoi that have dates of five and four million years, respectively. No news accounts of the Lake Rudolph site have ever mentioned the Harvard discoveries.

Dr. Isaac: I would like to plead not guilty, and perhaps turn the question after my response over to Professor Howell, who might indeed be able to answer it much more usefully than I.

I think part of the problem is that the distal end of a humerus by itself is not a very informative piece of bone to have. As I recall the original report on this particular discovery, it wound up by saying that this was definitely a hominoid articular end, and given the kind of geographical situation and so forth, it probably had to be from a hominid rather than from an ape. The characteristics are not very specific, and therefore the find doesn't provide any vital information about the pathway of human evolution. The importance of the Harvard discoveries is to demonstrate a continuing line of evolution in this area, going back beyond the sites we have principally been talking about in this symposium, going back five or six million years. But as yet we don't have from the earlier time levels anything like the detailed evidence that has come from the somewhat later time periods. Clark, would you like to add anything?

Dr. Howell: I couldn't add much more. The animals are very interesting from those sites. In particular, preservation is splendid in both sites and the material complete and very primitive, quite unlike what we have been talking about in the four to two million-year time range. Strikingly different. If you dropped yourself in on the three to four million-year old animals of this part of the world, and then, if knowing them and knowing the present, you dropped yourself back to the five million-year time range, you wouldn't find anything in common. It would all look very strange to you. That is interesting, and it shows very, very strong relationships with Asia, which were unknown previously.

Dr. Campbell: There is obviously a great deal of concern among you about conservation and preservation, and there are several questions that I would like just to handle together. Really, they are all asking what the public can do to help. First of all, in the case of archaeology, somebody tells me that a very valuable Paleo-Indian site in the city of San Mateo is about to go under the bulldozers, in spite of the fact that laws have been passed in this state to preserve such sites. The question is, is there anything that the public can do to help toward the preservation of archaeological sites? Before I ask Dr. Desmond Clark to answer that, I'm going to address the same kind of question to Jane Goodall about some of the species that are in

danger of extinction. I think perhaps the gorillas are in a worse situation than the chimpanzees, so maybe Dian Fossey would like to comment on that as well, but it is something which we should all be concerned about. May we just ask Dr. Clark first if he would like to comment on the question of archaeological conservation?

Dr. Clark: Well, I don't know too much about archaeological conservation in this country, but one of the things I would like to say is that I think a great deal can be done to insure that the amateur archaeologist, who is very active in this country as in Europe and Africa, can be informed by the professionals so that he can take much greater interest in the associations, in the meaning of the material that is found and looted, rather than simply collecting the material as many so-called pot hunters do today. This would make for much greater interest throughout the state, throughout the country. It can be done through local archaeological societies, so that you can well get the kind of situation that you have in, say, South Africa today, or in Britain, France, Germany, and so on, where a lot of the fine work that is being done by archaeologists is being done by amateurs as well as by professionals, and in some cases, even better. So far as the reporting of threatened sites is concerned, I think this is something everyone should know about, but you can report them to the state archaeologists, whose responsibility it is to investigate them and carry out the rescue operations. In a number of states--I don't know whether this is the case in California--so far as the granting of large contracts is concerned, something like 1 percent or so is put aside to finance the systematic excavation of threatened archaeological sites.

Dr. Campbell: Dian, would you say something about the gorillas? What can a member of the public do to help preserve them?

Dian Fossey: I think if the people of the Rwanda government--say the Minister of Tourism, or even the newly-elected President--realize that the outside world is interested in their animals and that this interest would definitely reflect in the management of their park, they would not only be surprised, but they would do something about it. Only now, because of

the study, are they beginning to realize that the world does care about their animals. Other than that, I would mention just the basic things, such as putting boots on the feet of the guards and clothing them. That does give them some incentive to do their work.

Dr. Campbell: The world does care about the gorilla, and I'm glad to see that this particular questioner also cares about the subsistence farmers and cattle owners of the district. The questioner goes on to say, "I'm very much disconcerted by the seeming lack of reciprocal concern for their need to eke out an existence. Imprisoning just inflicts further hardship and deprivation." Can you see any overall solution to this whole problem of the expanding population in Rwanda?

Dian Fossey: Yes, definitely. In 1961, the people were not allowed to take cattle into the park; they lived without taking their cattle into the park. They do not eat them, you understand, they are only using them as a form of capital. One cow represents $30 or $40. The cow serves no useful function, but the cow is really going to be the end of the country. And why should a cow that is not being eaten, not being milked, that is just standing around representing $30 or $40, do this to the gorilla? Whoever asked the question doesn't understand the entire picture. So now the people are changing; they are saying, why do I want a cow? Why have fifty cows? I have no place to put them, there's no land. Therefore, the cow cult, so to speak, is slowly fading out.

Dr. Campbell: Jane Goodall, would you like to add a word on conservation?

Dr. Goodall: I think a lot of people are concerned as to what they, individually, can do, and they feel a bit helpless. I don't know if Mrs. Margaret Owings is still in the audience. She was here yesterday. I think it's worth pointing out that practically single-handed she has managed to save the California sea otter around here from almost certain extinction because of the abalone fishermen. She raised a group of people who contributed and helped and fought and managed to get certain laws passed to protect the sea otter. Of course, when you come

to conservation in an African country you are faced with a difficult problem, because to a large extent, you rely on the good will of the government concerned. I feel particularly fortunate to be working in Tanzania, where the government people, headed by President Nyerere, are farsighted and are extremely helpful in what we are trying to do. I feel strongly that a major and very important way of trying to conserve animals within a developing country is not only to teach the people about the animals, but to teach them to enjoy those animals. Today the Tanzanians are beginning to feel that they want to preserve their national parks because they are their heritage; not just for tourism, but because the parks belong to them and to their children and to their children's children. And there are movements everywhere that one can join. I suppose the main thing one can do from America in that way is to provide financial support. We have a program at Gombe where we are training national park rangers from the different parks, teaching them how to observe baboons, and this is working marvelously. The rangers are very excited, the President is excited, since it fits in with his adult-education program, and the people themselves are becoming aware of how fascinating these animals are. I honestly feel that this is one major way in which conservation in these countries will be achieved.

Dr. Campbell: Thank you very much indeed. I think that also answers a question I have here about the training by you of local African students. This is obviously a very important development, and I am glad to hear about it. Now a question for Dr. Dart. Would you like to comment on why the South African form of Australopithecus differs from the East African form?

Dr. Dart: Well, we have in South Africa not only the Australopithecus africanus, but also the form that Broom identified as Paranthropus, particularly Paranthropus robustus. When the original Zinjanthropus was first announced in 1959 at the fourth Pan-African Congress, each of the scientists present, mostly anatomists, expressed their views with regard to it, and some of them felt, even then, that it was a pity for it to be separated from Australopithecus. I think that so far as these questions of differentiation are concerned, we stand greatly in need of understanding the range of variation in living men. It's a great shame that we don't know enough about

ourselves. A great many things are in the literature which one is quite satisfied would be changed if the whole of our available information were really gathered together, and if the ranges of shape of each particular bone in the body--the thickness and all the rest of it--were documented in the way that we know about bales of hay and all the business of the world. After all, what we know about these things is largely a question of work by interested individuals, and I think until man awakens to the fact that it is his own future that's at stake on this planet, nothing will be done about it that is more than tentative. We can talk here, but what about the gorilla? Has he no place on earth? And who is concerned, except organizations like our own? Nobody? The world is in that state. Surely the question should be submitted by the zoologists of the world demanding that certain things be done in respect of the earth's fauna as quickly as possible because it is being decimated. Our zoologists must unite in the same way a union unites to demand that humanity unite on particular issues. But no, humanity doesn't. Humanity is only concerned with differentiation and fighting and machinations against one another.

Homo sapiens? Where did we get the title? In the middle of the 17th century when people were just awakening to the fact that they had not yet classified anything on the earth, then man was sapient. All I can say is that I don't know any person I have met in my life who is entitled to consider himself sapient. And if we are to judge of the sapience of mankind by our leaders (so called!), General Smuts is the one politician that I ever knew who saw the necessity of men getting together and having a human point of view. He did his best, along with Woodrow Wilson, after the First World War. And after a decade or two, we had a Second World War. I agree absolutely with Robert Ardrey. We know how the world is being polluted, we know how the ocean is being sacrificed, we know how the whales have been decimated, and who did it? Man. I do not believe for one moment anything other than that man has destroyed his environment as rapidly as he could ever since he could wield an implement, and he has done it senselessly, ignorantly, and basely. What has that remarkable psychiatrist down in Los Angeles, Judd Marmor, written about psychiatry and the survival of mankind? He said that unfortunately there are, in America, three sacred cows--the money motive,

nationalism, and war. War is the thing man understands and is determined to have, even if it costs him millions of dollars. He couldn't trust his next-door neighbor, and until the world realizes what a menace man is to the earth, we cannot be other than self-depreciating. I would like to see organizations such as this devoted to teaching mankind that he is nonsapient.

Dr. Campbell: Thank you very much, Professor Dart. I would like to say, with reference to my own comments on Robert Ardrey's book, that I share with Raymond Dart his view of mankind. I differ with Robert Ardrey on one point alone, which is that aggression in man is not an instinct or a drive which requires regular expression. It is simply a response that is available to be evoked under stress. I see that Dart agrees. Professor Dart has given me one marvelous idea, though, on how to save the gorillas, and that is that we should all go on strike until something is done about it. If the zoologists of the world went on strike, then perhaps somebody would notice.

Now, here is a rather lighthearted question addressed to Jane Goodall. What is the role of the liberated male in the chimpanzee community?

Dr. Goodall: I'm not so sure there is such a thing as a liberated male, because to be liberated you must first be enslaved, and I don't think the male chimpanzee ever was. As for his role, well, he obviously procreates his species, and although we don't have very clear evidence for this, I think it is reasonable to assume that because he typically ranges farther afield than the female, he is the one likely to come across new food sources. Finally, we have recent evidence from Richard Wrangham at Gombe, who has been studying grouping and feeding patterns, that the males do tend to move frequently to the peripheries of the home ranges in groups of high-ranking animals, and, as it were, patrol the peripheries of those boundaries. In a sense they are maintaining a territory, which is something we had not realized before.

Dr. Campbell: A question for Dr. Hamburg. You indicated that the cause of the earlier onset of puberty in captive animals was nutritional. What components of the diet are relevant here?

Or what other explanations do you have?

Dr. Hamburg: I really don't know. As to the components in the diet, the only suggestions that have been made--and I think this is all pretty speculative--have to do with disease. That is, in human societies of the industrialized countries, as disease has come under control, partly through sanitation measures and partly through medical measures, there are fewer interferences with growth and development. Couple that with a generally richer diet and you get an earlier onset of puberty. There have also been speculations about stress, but really that problem has so many facets that I think it would be hopeless to get into it at the moment. The fact is that puberty in modern man has been getting earlier and may well have reached its limit in industrialized countries, and that in some way nutrition is probably the main contributing cause.

Dr. Campbell: A question for Dr. Clark. It seems that early man had a greater variety of stone tools than have the few remaining tribes that still use them. Why is that?

Dr. Clark: Well, I think one of the problems here is, are we quite sure that we do have a greater variety in the tool kits that we dig up? What do they represent? If, for example, we find what we can classify as ten different kinds of scrapers, are we in fact seeing ten different kinds of tools--functionally different tools--or are we looking at exactly the same kind of thing which, though on its morphological characteristics it has been classified as something different, is actually one and the same? For instance, if you look at the general range of knives or heavy scrapers that are still used today by stone-using people, you can find a variety of these things in the same way that you can find variety among tribulum flints. (Tribulum flints are small sharp pieces of flint or pieces of other stones inserted in the bottom of a sledge and dragged over wheat for the purpose of thrashing. They then acquire a characteristic damage pattern which can resemble the chipping on tools.)

But the morphological differences are generally meaningless. Our problem is to sort out what is functionally significant from what is not. This is where the real difficulty comes. Certainly

when we get to the upper Paleolithic, we do have a greater range of stone tools; through time we see this very clearly indeed. But of any one time range, are we quite certain that we really have a greater complexity in the stone-tool kit than we could find in the world today among people still using stone? In Ethiopia you can see rather involved forms of stone tools still being used in the scraping of skins. They are much more complex than anything that is made by Australian or New Guinea aborigines, or by anyone else in Africa that I know of, and may be some kind of an indication that we could use. There are certain kinds of stereotyped tools that continue to be used, and perhaps vestiges of the greater number of stereotyped forms, formalized forms, that were used in the past.

Dr. Campbell: There is one rather technical question here which I think we probably shouldn't dodge, and I am going to give it to Clark Howell. The biochemical analyses performed by Vincent Sarich places the divergence of man and his closest living relatives at a date much more recent than the paleontological dates suggest. Is there any way of reconciling the differences in these dates, short of rejecting Sarich's techniques?

Dr. Howell: I guess the answer is no.

Dr. Campbell: We have had a number of questions about the earth's magnetism, so I am going to give Dr. Hay an opportunity to talk about this in terms of a single question--or I guess it is really a double one. First, does the change in the magnetic poles have anything to do with the theory of continental drift? Second, do the changes mean that the poles always go 180 degrees or do they sometimes go only 90 degrees, or something of that kind?

Dr. Hay: Well, the relating of the change in the magnetic field to continental drift, along with the vast interest in it, shows that somehow this reaches our feelings of stability. No, there is no connection between the two, though we use the magnetic type of recording to detail continental drift. As for the second part, does the shift always reverse 180 degrees? No, apparently it does not. I'm not too clear about the information,

but when it reverses over a period of, say, five or ten thousand years, there is some pretty good evidence in Ngorongoro Caldera, for example, that it goes through a transitional stage where it can point at various angles between the two. In some other cases it virtually dies out, apparently in view of the lower intensity recorded.

Dr. Campbell: Are the stable directions all on the polar axis?

Dr. Hay: No, you can get intermediate directions.

Dr. Campbell: But not stable for any length of time?

Dr. Hay: Oh, I see. No, not stable for any length of time, but you can find lava flows that came out at a time when the earth's magnetic axis was at some angle other than 180 degrees.

Dr. Campbell: This leads to several questions about lava flows. Where did the flows of lava come from in the Olduvai area? Did some of the lava flow into the lake itself, and if so, what happened when it encountered the lake water?

Dr. Hay: Some of the flows came from Olmoti, the volcano whose explosive eruptions showered down ash over Olduvai at the time of Bed I. However, most flows came from a source buried beneath the Serengeti Plain, probably a few miles south of the gorge. Some of the lava probably flowed into the lake, although this cannot be proved because the gorge has not yet eroded deeply enough to expose the intertonguing of lavas with lake beds. The lava flows that met the water would have produced great clouds of steam, just as in Hawaii where lava flows run into the ocean.

Dr. Campbell: We are coming to the end of this afternoon, and to finish up we have an interesting and remarkable experience ahead of us, which is to listen to portions of a speech that was made by Dr. Louis Leakey at the Teilhard de Chardin Conference held in 1971 in this very auditorium. It's an excerpt lasting about five minutes, and we thought you would all appreciate the opportunity to hear it.

Dr. Louis B. Leakey: We are not a recent product of evolution. We have taken a long, long time to get where we are, and we have the possibility of a long, long future, if we but use our power of reason now. The first milestone in human evolution, an evolution of you and me back at 20 million years plus, was a physical step. The milestones are many, and I shall discuss those we are now about to erect, either as milestones or tombstones. And then began the second milestone in human evolution--man, the maker of cutting tools--a milestone that was to continue for a very long time. Man and his cousins are still diverging widely in different directions, one to end up as us and the others to end in oblivion--to end in oblivion because they failed to take the right direction in natural selection and they failed to see the outcome of a line of action. Homo sapiens are now accepted back in the Middle Pleistocene, datable at approximately 250,000 years ago. Homo sapiens are still Homo sapiens without certain things that make them like ourselves. I prefer to refer to them as Homo sapiens farber as distinct from the present subspecies, you and me: Homo sapiens sapiens--although I sometimes doubt that we deserve the first, or even the second, sapiens in view of our behavior.

Further, I have long pondered, as I know Teilhard did, what particular event it was that brought man to the next, the third, milestone in his evolution, when he began to formulate ideas of religion and to develop music--yes, music--back in the Upper Pleistocene. We know of it at two sites now. And art and many other things--magic, decorating his womenfolk with beads and so on. You can't really think and reason much, in terms of abstract words and abstract ideas, until you have speech. I believe that the third milestone of human evolution, the most vital one of all, came when man learned to make fire at will. This is the one that turned us into man the thinker, man with religious ideas, man with conceptual thought, man developing art, man developing magic, and eventually medicine and all the other things. It turned us from the animal man into man with the potential of you and me today. The potential of going to the moon, the potential of curing cancer, the potential of all the good things, and also of the bad things, like the atom bomb. It made it possible to begin to think

conceptual thoughts, to develop new ideas, to develop speech in abstract terms. It made it possible to reason, and consequently to control, if we wish to, our future.

Then came the fourth milestone, the one we speak of as the development of civilization, though, again, I'm not sure I like that word. It comprised the potter's wheel, agriculture, the domestication of animals, and all the things that we can think of as beginning the next stage. It has been written about so much that I needn't elaborate it for you. And that stage has continued until today. We are now nearing the end of the fourth milestone. Teilhard looked forward to a time when man would become much more perfect, the state of Omega. But Teilhard didn't know when he died how long we had taken from the time we turned the corner to become the first hominid until the present day, at least 20 million years or more. Teilhard, I'm sure, would have joined me in desperate worry about this present stage of human evolution, in desperate concern as to whether we would ever get to a point where we could start on the next stage of our development toward the perfect man, putting away all thoughts of war and violence. Why? Because at the moment we have so cluttered up our thinking that we are just wasting our potential.

I believe in the future of man. I'm not a pessimist. I believe we can do it. But the time is getting shorter and shorter if we are going to do it. I address my remarks now mainly to the young generation. You, the young, have got to see to it, and we of the older generation have got to help you see to it, that we use our powers of conceptual thought and reason to insure that our wonderful heritage--and it is a wonderful heritage--of art, music, science, religion, and the rest is not lost to us. It mustn't be lost to us. I want my grandchildren and my great-grandchildren, and so on for another 20 million years, to go on developing until they finally reach point Omega. It certainly won't happen if we now fail to appreciate the danger in which we stand. It can be done, but it must be done soon, otherwise there is no hope at all for humanity.

I don't believe today that man wants to perish. Five or six years ago there was an awful spirit of gloom, and I feel now that the young people are groping for a new idea. You have got to ask the older people to help you. It's up to you to force

the politicians to think again. If we have a strong enough public opinion, not only here but right across the world, I believe we can, we must, save mankind from himself. We won't reach perfection in a hurry; we will go on slowly and gradually. As Huxley says, we are in a state of psychosocial evolution now, our physical evolution is nearly over. Our psychosocial evolution has just begun, and what we do with that psychosocial evolution is in your hands and in the hands of the many who are listening to me or who will listen to me later. Now is the time when you must make the choice. Change or perish.

Volume I / 1970-71

1 A Black Mauritian Poet Speaks $1
Edouard Maunick

2 South Africa: Three Visitors Report $2
George Kennan, Leon Gordenker, Wilton Dillon

3 Choiseul Papers. Unpublished ms 1761 on secret British and French machinations in West Africa. $4

4 How Black South African Visitors View the U.S. $1
E. S. Munger

5 Current Politics in Ghana $1
John Fynn, M.P.

6 Walking 300 Miles with Guerillas Through the Bush of Eastern Angola (Map) $2
Basil Davidson

Volume II / 1971-72

7 An Exploration Near Agades and Timbuktu In Advance of the 1973 Total Solar Eclipse $2
Jay M. Pasachoff

8 A Brown Afrikaner Speaks: A Coloured Poet and Philosopher Looks Ahead $1
Adam Small

9 Dialogue on Aggression and Violence in Man $3
Louis Leakey, Robert Ardrey

10 The Past and Future of the Zulu People $1
Gatsha Buthelezi

11 The Anya-nya: Ten Months Travel with Its Forces Inside the Southern Sudan (Map) $2
Allan Reed

12 "Dear Franklin . . . " Letters to President Roosevelt from Lincoln MacVeagh, U.S. Minister to South Africa, 1942-43 $3
Comment by John Seiler

Volume III / 1972-73

13 Eritrean Liberation Front: A Close-Up View (Map, Photographs) $1
Richard Lobban

14 The Uganda Coup and the Internationalization of Political Violence $2
James Mittelman

15 Sierra Leone Notebook (1893) Revealing important deletions from official despatches of Governor Francis Fleming (Map) $3
Comment by Kenneth Mills

16 Blood Group Frequencies: An Indication of the Genetic Constitution of Population Samples in Cape Town $3
M. C. Botha, M.D., with Judith Pritchard
Comment by R. D. Owen

17 The Ovambo: Our Problems and Hopes (Illustration, Maps) $2
Bishop Leonard N. Auala of Southwest Africa/Namibia

18 Inside Amin's Uganda: More Africans Murdered $1

Volume IV / 1973-74 (partial listing)

19 Report on Portugal's War in Guine-Bissau $5
(206 pages; 27 photos, maps)
Al J. Venter
(Also available in hard cover for $10)
"This unusually objective account of the Portuguese side of the Guine-Bissau war finds the Colonial army at least a match for the guerillas in skill and tenacity. . . ."

FOREIGN AFFAIRS

"Venter provides the student of Guinea-Bissau with a nicely written in-depth view of Portuguese activities. It is clearly the most sophisticated discussion partial to the Portuguese position in Africa that this reviewer has read. As such it is devoid of propagandistic inferences. Portuguese weaknesses and mistakes are identified as well as their strengths and successes. And the African rebels are portrayed with considerable respect and near admiration."

Professor Ronald Chilcote in AFRICA TODAY

20 Will Bophuthatswana Join Botswana? $1
(photographs, maps)
Chief Minister Lukas Mangope

21 Demographic Trends in the Republic of Zaire $1
Professor Joseph Boute

22 South Africa's Homelands: Two African Views $2
Chief Minister Cedric Phatudi of Lebowa and Chief Clemens Kapuuo of South West Africa/Namibia

23 Pragmatism and Idealism in Brazilian Foreign Policy in Southern Africa $1
Professor Roy Glasgow

The Munger Africana Library is housed in the Dónald E. Baxter, M.D., Hall of the Humanities and Social Sciences at the California Institute of Technology in Pasadena, California.

It is devoted solely to Africa south of the Sahara, and includes 20,000 books and pamphlets. Its strength lies in rare books and manuscripts on such countries as Liberia, Ghana, Swaziland, and South Africa.

Serious research scholars are invited to use the library, and working facilities are provided on request. The library is non-circulating.